



Pearson marrow-pancreas syndrome

Pearson marrow-pancreas syndrome is a severe disorder that usually begins in infancy. It causes problems with the development of blood-forming (hematopoietic) cells in the bone marrow that have the potential to develop into different types of blood cells. For this reason, Pearson marrow-pancreas syndrome is considered a bone marrow failure disorder. Function of the pancreas and other organs can also be affected.

Most affected individuals have a shortage of red blood cells (anemia), which can cause pale skin (pallor), weakness, and fatigue. Some of these individuals also have low numbers of white blood cells (neutropenia) and platelets (thrombocytopenia). Neutropenia can lead to frequent infections; thrombocytopenia sometimes causes easy bruising and bleeding. When visualized under the microscope, bone marrow cells from affected individuals may appear abnormal. Often, early blood cells (hematopoietic precursors) have multiple fluid-filled pockets called vacuoles. In addition, red blood cells in the bone marrow can have an abnormal buildup of iron that appears as a ring of blue staining in the cell after treatment with certain dyes. These abnormal cells are called ring sideroblasts.

In people with Pearson marrow-pancreas syndrome, the pancreas does not work as well as usual. The pancreas produces and releases enzymes that aid in the digestion of fats and proteins. Reduced function of this organ can lead to high levels of fats in the liver (liver steatosis). The pancreas also releases insulin, which helps maintain correct blood sugar levels. A small number of individuals with Pearson marrow-pancreas syndrome develop diabetes, a condition characterized by abnormally high blood sugar levels that can be caused by a shortage of insulin. In addition, affected individuals may have scarring (fibrosis) in the pancreas.

People with Pearson marrow-pancreas syndrome have a reduced ability to absorb nutrients from the diet (malabsorption), and most affected infants have an inability to grow and gain weight at the expected rate (failure to thrive). Another common occurrence in people with this condition is buildup in the body of a chemical called lactic acid (lactic acidosis), which can be life-threatening. In addition, liver and kidney problems can develop in people with this condition.

About half of children with this severe disorder die in infancy or early childhood due to severe lactic acidosis or liver failure. Many of those who survive develop signs and symptoms later in life of a related disorder called Kearns-Sayre syndrome. This condition causes weakness of muscles around the eyes and other problems.

Frequency

Pearson marrow-pancreas syndrome is a rare condition; its prevalence is unknown.

Genetic Changes

Pearson marrow-pancreas syndrome is caused by defects in mitochondria, which are structures within cells that use oxygen to convert the energy from food into a form cells can use. This process is called oxidative phosphorylation. Although most DNA is packaged in chromosomes within the nucleus (nuclear DNA), mitochondria also have a small amount of their own DNA, called mitochondrial DNA (mtDNA). This type of DNA contains many genes essential for normal mitochondrial function. Pearson marrow-pancreas syndrome is caused by single, large deletions of mtDNA, which can range from 1,000 to 10,000 DNA building blocks (nucleotides). The most common deletion, which occurs in about 20 percent of affected individuals, removes 4,997 nucleotides.

The mtDNA deletions involved in Pearson marrow-pancreas syndrome result in the loss of genes that provide instructions for proteins involved in oxidative phosphorylation. These deletions impair oxidative phosphorylation and decrease the energy available to cells. It is not clear how loss of mtDNA leads to the specific signs and symptoms of Pearson marrow-pancreas syndrome, although the features of the condition are likely related to a lack of cellular energy.

Inheritance Pattern

Pearson marrow-pancreas syndrome is generally not inherited but arises from new (de novo) mutations that likely occur in early embryonic development.

Other Names for This Condition

- Pearson syndrome

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Pearson marrow-pancreas syndrome
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C0342773/>

Other Diagnosis and Management Resources

- GeneReview: Mitochondrial DNA Deletion Syndromes
<https://www.ncbi.nlm.nih.gov/books/NBK1203>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>
- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Encyclopedia: Lactic Acidosis
<https://medlineplus.gov/ency/article/000391.htm>
- Encyclopedia: Malabsorption
<https://medlineplus.gov/ency/article/000299.htm>
- Encyclopedia: Pancreas
<https://medlineplus.gov/ency/imagepages/8883.htm>
- Health Topic: Bone Marrow Diseases
<https://medlineplus.gov/bonemarrowdiseases.html>

Genetic and Rare Diseases Information Center

- Pearson syndrome
<https://rarediseases.info.nih.gov/diseases/7343/pearson-syndrome>

Additional NIH Resources

- National Cancer Institute: Inherited Bone Marrow Failure Syndromes
<https://dceg.cancer.gov/research/what-we-study/bone-marrow-failure-syndromes>
- National Institutes of Health Rare Diseases Clinical Research Network: North American Mitochondrial Disease Consortium
<http://www.rarediseasesnetwork.org/cms/NAMDC>

Educational Resources

- Cleveland Clinic Online Health Chats: Understanding Mitochondrial Disorders
http://my.clevelandclinic.org/health/transcripts/parikh_understanding_mitochondrial_disorders
- Disease InfoSearch: Pearson marrow-pancreas syndrome
<http://www.diseaseinfosearch.org/Pearson+marrow-pancreas+syndrome/5634>
- MalaCards: pearson syndrome
http://www.malacards.org/card/pearson_syndrome
- Mayo Clinic: Mitochondrial Disease Biobank
<http://www.mayo.edu/research/centers-programs/mitochondrial-disease-biobank/overview>
- Orphanet: Pearson syndrome
http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=699
- The University of Arizona
<http://disorders.eyes.arizona.edu/category/alternate-names/pearson-syndrome>
- United Mitochondrial Disease Foundation: What Is Mitochondrial Disease?
<http://www.umdf.org/what-is-mitochondrial-disease/>

Patient Support and Advocacy Resources

- MitoAction
<http://www.mitoaction.org/>
- United Mitochondrial Disease Foundation
<http://www.umdf.org/>

GeneReviews

- Mitochondrial DNA Deletion Syndromes
<https://www.ncbi.nlm.nih.gov/books/NBK1203>

ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?cond=%22Pearson+marrow-pancreas+syndrome%22>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28Mitochondrial+Diseases%5BMAJR%5D%29+AND+%28%28pearson+marrow-pancreas+syndrome%5BTIAB%5D%29+OR+%28pearson+syndrome%5BTIAB%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22%5Bdp%5D>

OMIM

- PEARSON MARROW-PANCREAS SYNDROME
<http://omim.org/entry/557000>

Sources for This Summary

- Manea EM, Leverger G, Bellmann F, Stanescu PA, Mircea A, Lèbre AS, Rötig A, Munnich A. Pearson syndrome in the neonatal period: two case reports and review of the literature. *J Pediatr Hematol Oncol*. 2009 Dec;31(12):947-51. doi: 10.1097/MPH.0b013e3181bbc4ef. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/19881395>
- Rötig A, Bourgeron T, Chretien D, Rustin P, Munnich A. Spectrum of mitochondrial DNA rearrangements in the Pearson marrow-pancreas syndrome. *Hum Mol Genet*. 1995 Aug;4(8):1327-30.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/7581370>
- Sadikovic B, Wang J, El-Hattab A, Landsverk M, Douglas G, Brundage EK, Craigen WJ, Schmitt ES, Wong LJ. Sequence homology at the breakpoint and clinical phenotype of mitochondrial DNA deletion syndromes. *PLoS One*. 2010 Dec 20;5(12):e15687. doi: 10.1371/journal.pone.0015687.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/21187929>
Free article on PubMed Central: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3004954/>
- Tumino M, Meli C, Farruggia P, La Spina M, Faraci M, Castana C, Di Raimondo V, Alfano M, Pittalà A, Lo Nigro L, Russo G, Di Cataldo A. Clinical manifestations and management of four children with Pearson syndrome. *Am J Med Genet A*. 2011 Dec;155A(12):3063-6. doi: 10.1002/ajmg.a.34288. Epub 2011 Oct 19.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/22012855>

Reprinted from Genetics Home Reference:

<https://ghr.nlm.nih.gov/condition/pearson-marrow-pancreas-syndrome>

Reviewed: May 2013

Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services